WHAT IS CLAIMED IS:

1. A method of detecting and locating noise sources each emitting respective signals S_j where j = 1 to M, detection being provided by means of acoustic wave or vibration sensors each delivering a respective time-varying electrical signal s_i with i varying from 1 to N, the method consisting:

· in taking the time-varying electrical signals delivered by the sensors, each signal $s_i(t)$ delivered by a sensor being the sum of the signals S_j emitted by the noise sources;

· in amplifying and filtering the taken time-varying electrical signals;

· in digitizing the electrical signals;

· in calculating the functional

$$f(\boldsymbol{n}_1, \ldots, \boldsymbol{n}_j, \ldots, \boldsymbol{n}_N) = \sum_{k \neq l} R_{kl}$$

with the coefficients R_{kl} being a function of the vectors $\boldsymbol{n}_j$ giving the directions of the noise sources; and

· in minimizing the functional f in such a manner as to determine the directions $\boldsymbol{n}_j$ of the noise sources.

2. A method according to claim 1, wherein, in order to minimize the functional f, the method consists in:

· calculating the Fourier transforms of the signals $s_i(t)$ delivered by the sensors;

· formally calculating the coefficients R_{ij}:

$$R_{ij} = \frac{\int_{-\infty}^{+\infty} \left|\hat{S}_i(\omega)\right|^2 . \left|\hat{S}_i(\omega)\right|^2 d\omega}{\int_{-\infty}^{+\infty} \left|\hat{S}_i(\omega)\right|^2 d\omega . \int_{-\infty}^{+\infty} \left|\hat{S}_j(\omega)\right|^2 d\omega}$$

· and minimizing the functional f in order to determine the directions $\boldsymbol{n}_j$ of the selected noise sources.

3. A detection method according to claim 1, wherein, in order to minimize the functional f, the method consists:

· in formally calculating the correlation coefficient R_{ij}:

$$R_{ij} = \frac{\int_{-\infty}^{+\infty} \Gamma_{ij}^2(\tau) d\tau}{\Gamma_{ii}(0) . \Gamma_{jj}(0)}$$

where Γ_{ij} is the cross-correlation function between the signals S_i and S_j.

4. A detection method according to claim 1, wherein, after performing the minimization operation, the method consists in calculating the source vector:

$$\boldsymbol{S}(w) = ({}^{t}T^{*} . T)^{-1} . {}^{t}T^{*} . \boldsymbol{s}(\omega)$$

in order to find the characteristics of the noise sources.